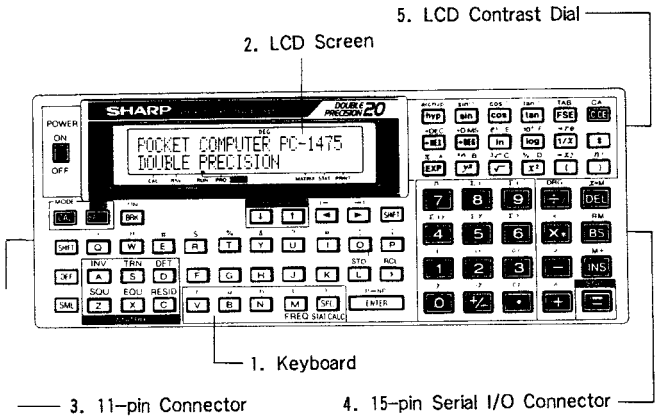
PC-1475

SHARP SERVICE MANUAL

CODE : 00ZPC1475SM/E

MODEL PC-1475

1. KEY LAYOUT



2. General

The PC-1475 has the double precision BASIC and the data base static function, but it does not has the internal RAM. Despite, it has two small RAM card slots, though it does not operate without RAM card.
Low battery can be detected by the low battery circuit.

3. SPECIFICATIONS

Model name:
PC-1475

Arithmetic capacity:
Single precision ..... 10 digits (mantissa) + 2 digits (exponent)
Double precision ..... 20 digits (mantissa) + 2 digits (exponent)
However, calculation is done in the single precision under the CAL mode.

Arithmetic mode:
According to the formula (with the priority discrimination function)

Programming language:
BASIC

System ROM:
8-bit CMOS microprocessor

Memories:
System area ..... About 1.3K bytes
Data only area ..... 208 byte
Program/data area ..... 6558 bytes
Reserve area ..... 144 bytes

Stacks:
Subroutine ..... 10 stacks
FOR – NEXT ..... 5 stacks
Functional ..... 16 stacks
Data ..... 8 stacks

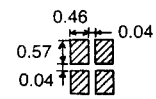
Basic arithmetic functions:
Basic functions ..... Four math rules
Functional ..... Trigonometric, inverse trigonometric, hyperbolic, inverse hyperbolic, logarithmic, exponential, angular transformation, power raising, power root, coordinate transformation, square root, ratio of integers, absolute value, signed function, circle ratio, and others.

Editing functions:
Horizontal cursor control (▶, ◀)
Insertion (INS)
Deletion (DEL)
Line up and down (↑, ↓)

Serial I/O:
Communication mode ..... Async, half-duplex only
Baud rate ..... 300, 600, 1200 bps
Parity check bit ..... Even, odd, none
Word length ..... 7, 8 bits
Stop bit(s) 1, 2
Connector ..... 15-pin connector for connection with an external device
Output signal level ..... CMOS level (4 ~ 6 volts)
Interfacing signals ..... (Input) RD, CS, CD, PAK
(Output) SD, RS, RR, ER, PRQ
(Others) SG, FG, VC

Memory protection:
Battery backup (for protection of program and data during power off)

Display:
5 × 7 dot matrix liquid crystal display, 24 digits × 2 lines



Operating temperature:
0 to 40°C

Power supply:
6V ⎓ (DC): lithium battery (CR-2032 × 2)

Battery life:
Approx. 120 hours continuous under normal condition. (10 minutes of operation or program execution per hour under the temperature of 20°C and 50 minutes of displaying.)
There may be a slight variation depending on the operating conditions and usage.

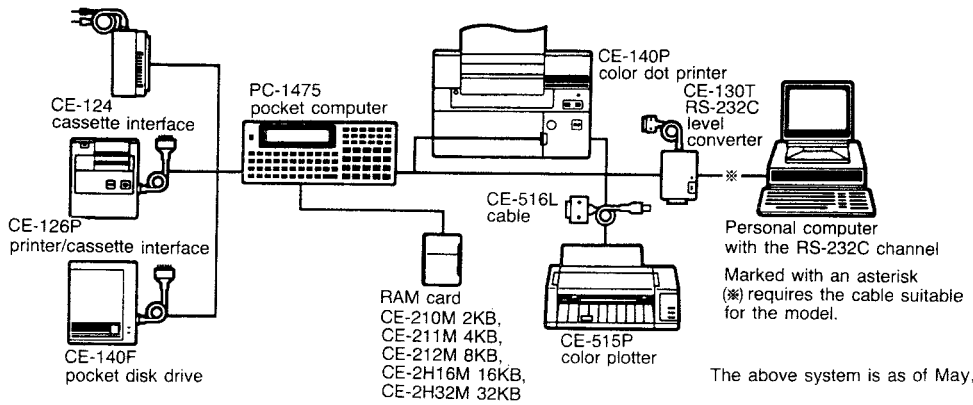
Power consumption:
0.03W

Physical dimensions:
182mm(W) × 72mm (D) × 166mm (H)

Weight:
190 grams, including battery and RAM card

Accessories:
Hard cover, templates (×2), internal lithium battery cells (×2), instruction manual, RAM card (CE-212M, with internal battery)

4. SYSTEM BLOCK DIAGRAM



The above system is as of May, 1987.

5. POWER SUPPLY AND POWER CONSUMPTION

Power supply (PC-1475)

CR-2032 lithium battery cell × 2 pieces	Capacity:170mAH	Terminal voltage: about 6.0V

Power consumption (PC-1475)

When the POWER switch is off	45μA, maximum
When the POWER switch is on.	40μA, maximum

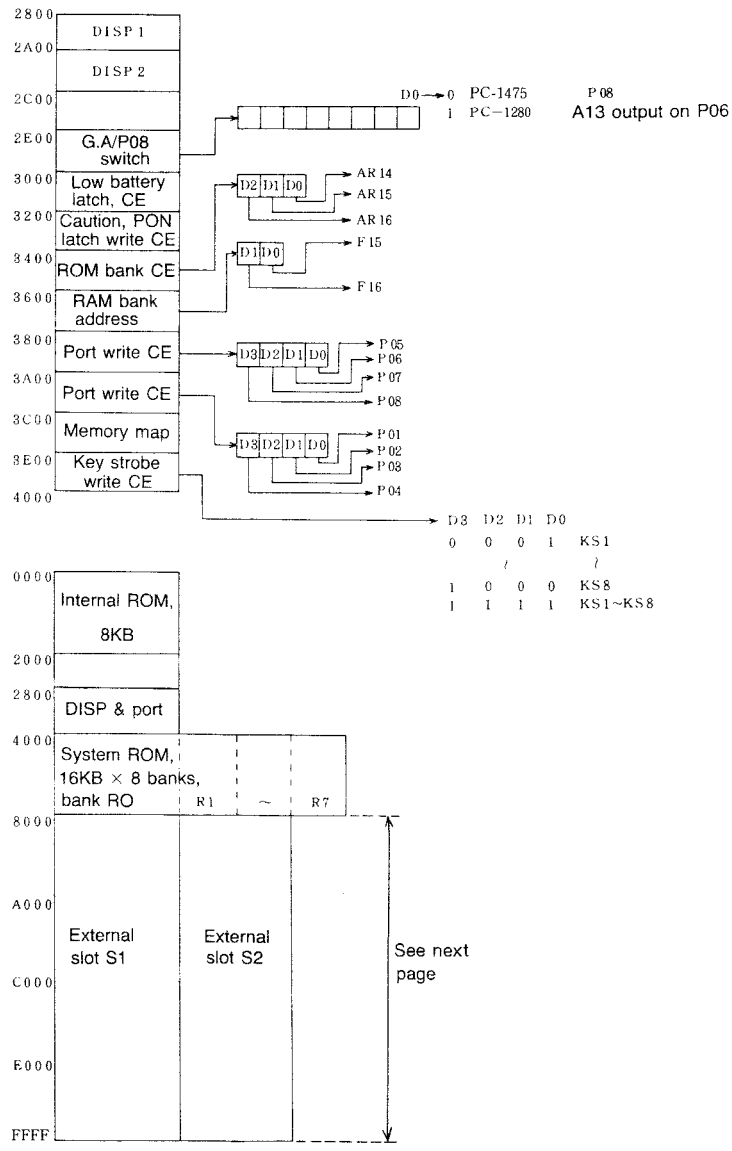
6. BATTERY REPLACEMENT PROCEDURE

① Set the POWER switch OFF.
② Move the LOCK switch to the S2 OPEN position and open the back cover on the slot-2 side. The LOCK switch is located on the back side of the PC-1475. Ensure that the RAM card is not within the slot-2 and close the back cover, then set the LOCK switch to the middle position. If there is a RAM card within the slot-2, remove the card in reference to ④.
③ Move the LOCK switch to the S1 OPEN position and remove the back cover on the slot-1 side.
④ Pull the card install lever to remove the RAM card.
⑤ Remove the battery holder, while lightly pressing the stopper.
⑥ Replace the used battery cells with fresh ones.
Be sure to wipe dry each battery cell, and install the battery cells in their given polarity.
⑦ Replace the battery holder.
⑧ Replace the slot-1 side back cover and set the LOCK switch to the LOCK position. Do not install the RAM card yet at this point.
NOTE: It is mandatory to set the LOCK switch at the LOCK position, otherwise, the pocket computer will not operate. If the power is turned on without the LOCK switch at the LOCK position, set the LOCK switch to the LOCK position, turn power off, then power on again.
⑨ Set the POWER switch to the ON position and press the ALL RESET switch found on the back of the pocket computer.
⑩ Make sure that the symbol "✻" is seen in the right side of the display window. If not seen, remove the battery cells and set them again. Then, check to see if the symbol is displayed in the display window.

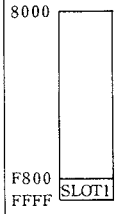
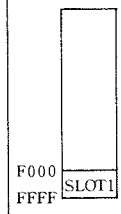
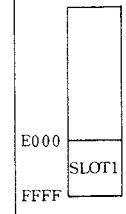
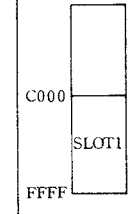
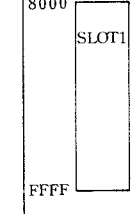
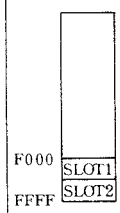
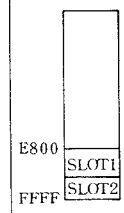
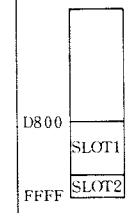
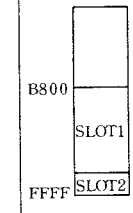
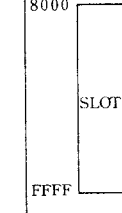
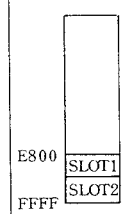
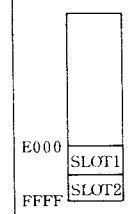
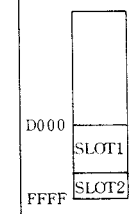
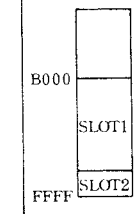
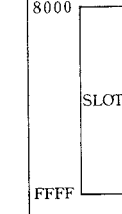
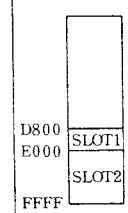
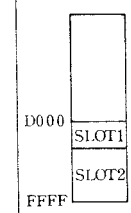
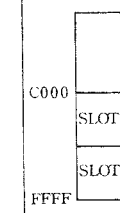
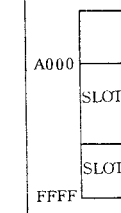
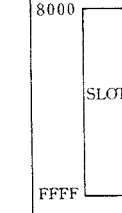
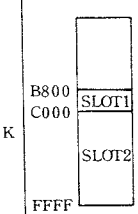
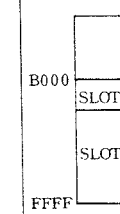
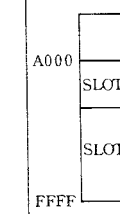
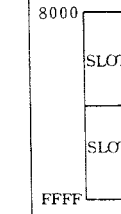
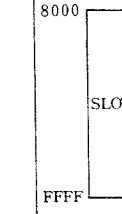
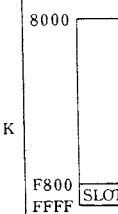
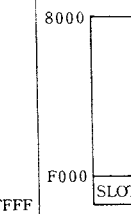
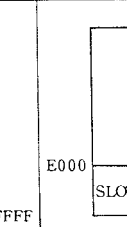
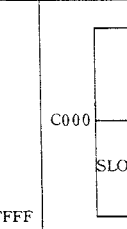
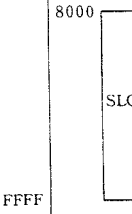
⑪ Set the POWER switch to the OFF position and install the RAM card.

NOTE: The RAM card must be installed after replacing the battery cells and observing steps ⑨ and ⑩.
If the RAM card was already installed when the battery is replaced at ⑨, the data stored in the RAM card will be erased.

7. MEMORY MAP



Memory map for RAM cards

1 \ 2	2K	4K	8K	16K	32K
Not use	 F800～FFFF 2K	 F000～FFFF 4K	 E000～FFFF 8K	 C000～FFFF 16K	 8000～FFFF 32K
2K	 F000～FFFF 4K	 E800～FFFF 6K	 D800～FFFF 10K	 B800～FFFF 18K	 BANK C0 8000～FFFF BANK C1 8000～87FF 34K
4K	 E800～FFFF 6K	 E000～FFFF 8K	 D000～FFFF 12K	 B000～FFFF 20K	 BANK C0 8000～FFFF BANK C1 8000～8FFF 36K
8K	 D800～FFFF 10K	 D000～FFFF 12K	 C000～FFFF 16K	 A000～FFFF 24K	 BANK C0 8000～FFFF BANK C1 8000～9FFF 40K
16K	 B800～FFFF 18K	 B000～FFFF 20K	 A000～FFFF 24K	 8000～FFFF 32K	 BANK C0 8000～FFFF BANK C1 8000～BFFF 48K
32K	 BANK C0 F800～FFFF BANK C1 8000～FFFF 34K	 BANK C0 F000～FFFF BANK C1 8000～FFFF 36K	 BANK C0 E000～FFFF BANK C1 8000～FFFF 40K	 BANK C0 C000～FFFF BANK C1 8000～FFFF 48K	 BANK C0 8000～FFFF BANK C1 8000～FFFF 64K

8. CHIP DESCRIPTION

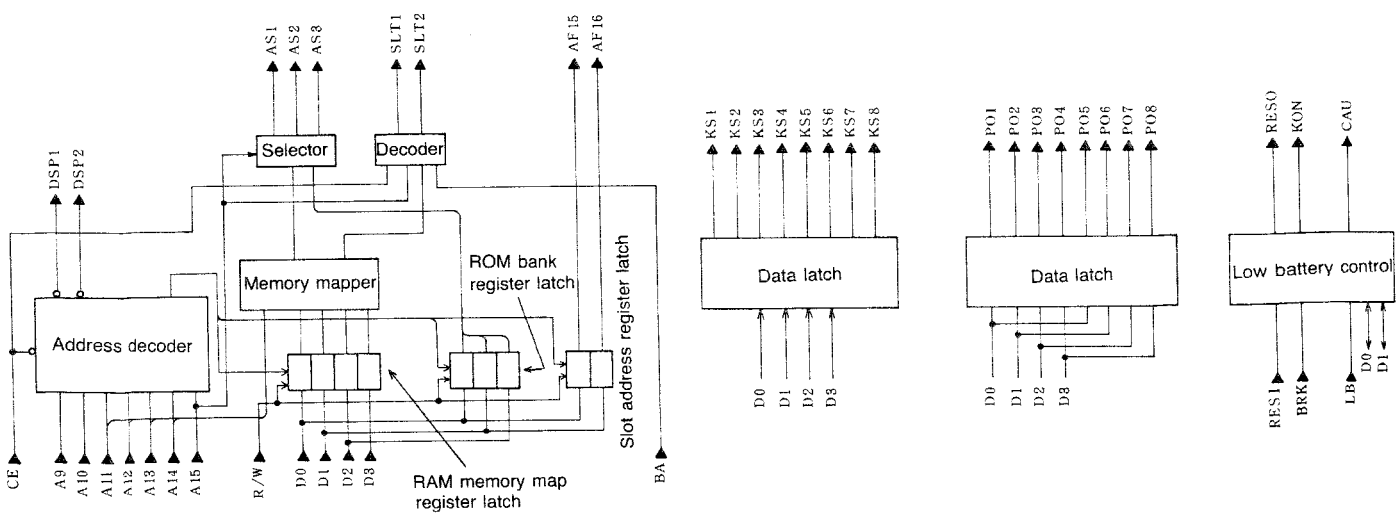
8-1. SC61860A38 CPU signal description

Pin No.	Signal name	In/Out	Description, standby = power off
1	A0	Out	Address bus A0, high during standby
2	R/W	Out	Write lock, normally high
3	ϕAL	Out	Address latch, used to latch LCD driver address
4	TES	In	Test pin, normally set to low level
5	ϕI	In	Oscillator input
6	ϕO	Out	Oscillator output
7	RES	In	Reset input, active high
8	XIN	In	cassette signal input
9	KON	In	ON/BRK key input, normally pulled down to low
10	XOUT	Out	Cassette and buzzer signal output
11	DIS	Out	LCD driver control, high during display
12	HA	Out	LCD driver sync clock
13	IA8	In/out	Key input and key strobe, also used as SIO PAK (Printer AcKnowledge) input
⌇	⌇	⌇	⌇
20	LA1	In/out	Key input and key strobe, low during standby
21	IB8	In	SIO CD (send request from other side)
22	IB7	In	SIO CS (ready to send from other side)
23	IB6	In	SIO RD (receive data)
24	IB5	In	11-pin ACK (11-pin interface acknowledge)
25	IB4	In	11-pin DIN (11-pin interface input data)
26	IB3	In	11-pin DOUT (11-pin interface input data)
27	IB2	In	11-pin IO2 (11-pin interface input data)
28	IB1	In	11-pin IO1 (11-pin interface input data)
29	VM	In	LCD drive power supply
30	VA	In	LCD drive power supply
31	GND	In	⊕ supply
32	H1	Out	LCD backplate signal, 4-pulse signal during display (1/14 duty)
⌇	⌇	⌇	⌇
45	H14	Out	LCD backplate signal, 4-pulse signal during display (1/14 duty)
46-47	H15-H16	Out	Not used (because of 1/14 duty)
48	VB	In	LCD drive power supply, high during standby
49	VDIS	In	LCD drive power supply, high during standby
50	VCC	In	LCD drive power supply, high during standby
51	VDC	Out	LCD drive power supply, high during standby
52	VGG	In	⊖ supply
53	O8	In/out	Data bus D7, normally high impedance
⌇	⌇	⌇	⌇
60	O1	In/out	Data bus D0, normally high impedance. 8000H max.
61	FO5	In	Gate array ① chip enable (CE)
62	FO4	In	ROM chip select (CS)
63	FO3	In	RAM card bank select (BA)
64	FO2	In	SIO SD (transmit data)
65	FO1	In	Low battery IC level control
66	BO8	In	Address bus A15, high during standby
⌇	⌇	⌇	⌇
73	BO1	In	
74	AO8	In	
⌇	⌇	⌇	⌇
80	AO2	In	Address bus A1, high during standby

8-2. LZ92K38 GATE ARRAY SIGNAL DESCRIPTION

Pin No.	Signal name	In/Out	Description, standby = power off
1	BA	In	RAM bank select
2	CE	In	Chip enable, active low
3	DO0	In	Data bus input D0
⟩	⟩	⟨	⟩
6	DO3	In	Data bus input D3
7	GND	In	⊖ supply
8	PO1	Out	11-pin IO1 (11-pin interface output data), P-ch open output
9	PO2	Out	11-pin IO2(11-pin interface output data), P-ch open output
10	PO3	Out	11-pin DOUT (11-pin interface output data) and SIO PRQ (Printer ReQuest, P-ch open output
11	PO4	Out	11-pin DIN (11-pin interface output data), P-ch open output
12	PO5	Out	11-pin BUSY (11-pin interface output data), P-ch open output
13	PO6	Out	High by the SIO ER OPEN instruction
14	PO7	Out	SIO RR (PC ready to receive)
15	PO8	Out	SIO RS (PC send request)
16	AS1	Out	System ROM address A14 and RAM card slot A11
17	AS2	Out	System ROM address A15 and RAM card slot A12
18	AS3	Out	System ROM address A16 and RAM card slot A13
19	AF15	Out	Slot address A15
20	AF16	Out	Slot address A16
21	SLT1	Out	RAM card slot S1 chip enable
22	SLT2	Out	RAM card slot S2 chip enable
23	DSP1	Out	LCD driver chip enable
24	DSP2	Out	LCD driver chip enable
25	RESO	Out	Reset to CPU RES
26	KON	Out	Break to CPU KON
27	LB	In	Low battery signal from the low battery IC, normally high
28	RESI	In	Input from the RESET switch
29	BRK	In	Input from the BRK key
30	Vcc	In	⊕ supply
31	GND	In	⊖ supply
32	CAN	In	Low battery detect signal select
33	KS1	Out	Key strobe, P-ch open output
⟩	⟩	⟨	⟩
40	KS8	Out	Key strobe, P-ch open output
41	R/W	In	Write lock
42	A9	In	Address bus input A9
⟩	⟩	⟨	⟩
47	A15	In	Address bus input A15

GA(LZ92K38) block diagram



9. DIAGNOSES BY THE TEST PROGRAM

Diagnostic program is contained within the ROM.

- Test items

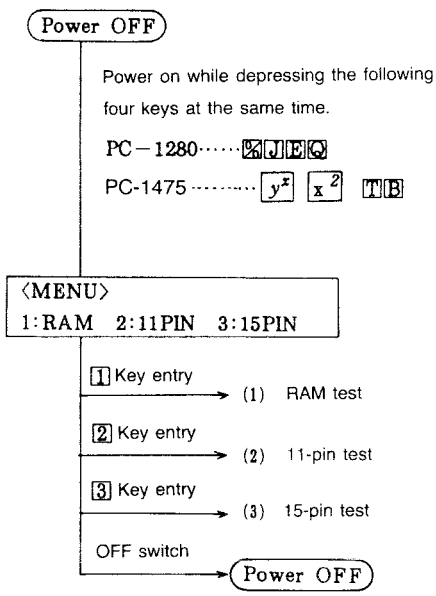
(1) RAM card read after write test
(2) 11-pin I/O test
(3) 15-pin I/O test

- Tools required

The special tool UKOGC3020CSZZ is required for the test items (2) and (3). UKOGC3020CSZZ is the special tool used for the PC-1360 whose price rank is BC.

- Precautions

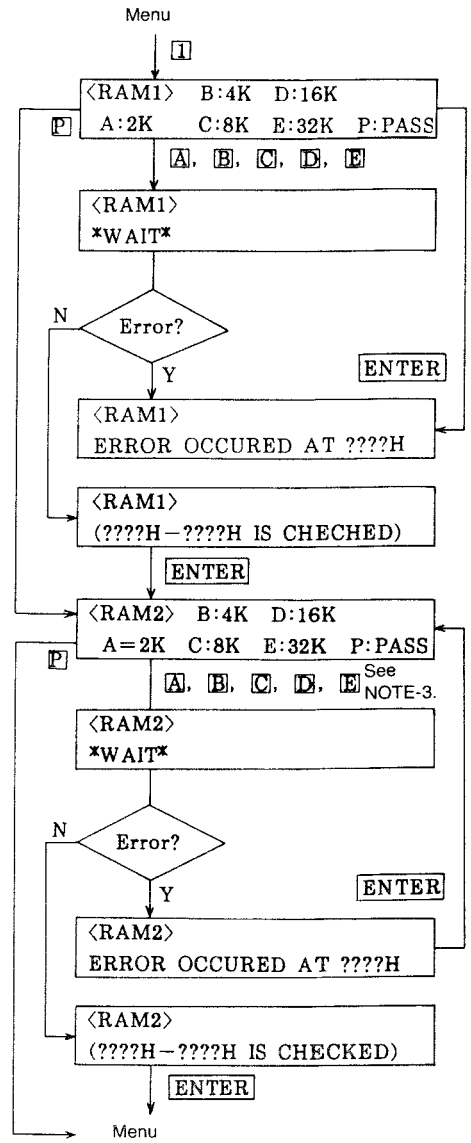
Because the contents of the RAM are erased after execution of the test item (1), the program and data further required must be saved before the test.



NOTE-1: Power may be turned off while the above menu is on display.
NOTE-2: If the test program should not start, check keys.

- Test item descriptions

(1) RAM test



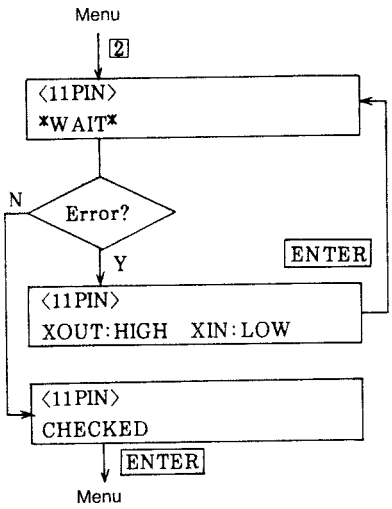
NOTE-3: The table below shows the relation of the RAM vs. slot.

	PC−1280	PC−1475
RAM1	SLOT	SLOT1
RAM2	Internal 8KB RAM	SLOT2

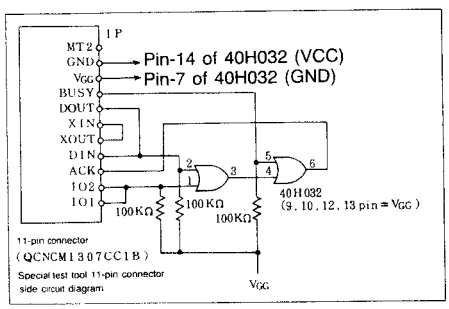
NOTE-4: The contents of the RAM are lost in a course of the test. Select PASS to avoid erasing of the RAM contents.

(2) 11-pin test

Fasten the special tool 11-pin connector with the 11-pin connector found on the left of the main unit, with the part side facing up.



NOTE-5: See the figure below for the test pin location and test sequence.

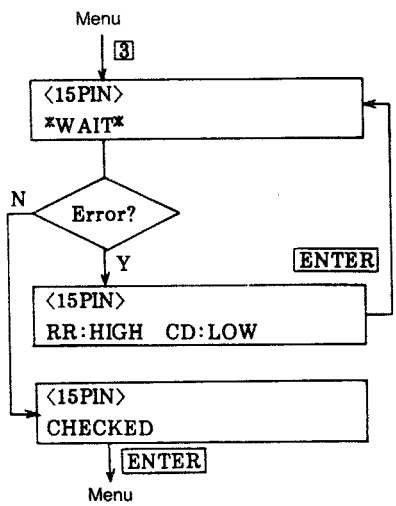


NOTE-6: No error is caused in case signals being tested are shorted within the circuit.

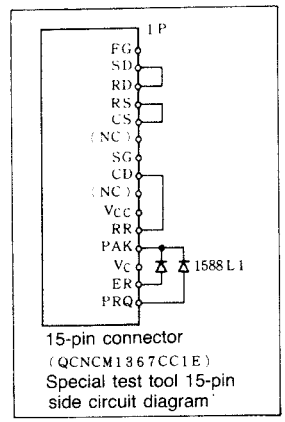
(3) 15-pin test (this test is not required for the PC-1280)

Fasten the special tool 15-pin connector with the 15-pin connector found on the right of the main unit, with the part side facing up.

NOTE: The 15-pin connector is not used for the PC-1280.



NOTE-7: See the figure below for the test pin location and test sequence.



① RR→CD
② RS→CS
③ SD→RD
④ PRQ→PAK
⑤ ER→PAK

NOTE-8: No error is caused in case signals being tested are shorted within the circuit.

10. Low Battery Detect Circuit

Discussed next is about the low battery detect circuit which is incorporated in the PC-1475.

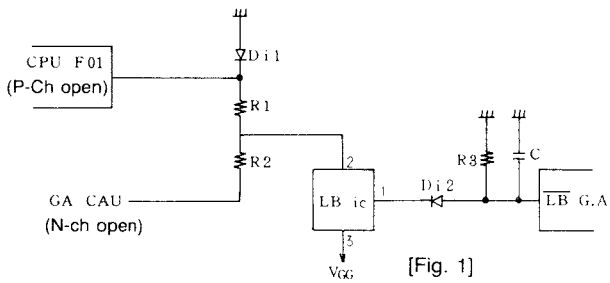
As shown in the figure BELOW, when the input voltage VIN goes above the detect voltage level VD, its output turns to high level. On the contrary, when VIN goes below VD, the output turns to low level.

Two levels of caution and stop are detected by a single IC (LB iC = MN1280).

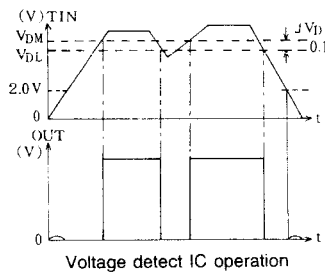
The input voltage added to the input pin (No.2) is divided by R1 and R2, and R2 is turned on/off by the CAU signal of G.A. As shown in Fig.3, when the supply voltage drops below the caution level, the BATT symbol comes to activate. When it further drops down below the stop level, the symbol goes out.

To sense the caution level, the CAU line of the G.A. is set active (low) and the state on $\overline{LB}$ of the G.A. is checked. If $\overline{LB}$ is at a low, the symbol activates. When the caution label is sensed, the CAU line is set off (high impedance). With this, the voltage increases on the LB iC pin 2 because there is no more voltage division by resistors, so that the output changes from low to high level. As the $\overline{LB}$ line of the G.A. is sensed again, the stop level is detected.

During standby, F01 of the CPU and CAU of the G.A. are set at high impedance and Di1 is inserted to correct the battery drop during standby and operation. The ON/BRK and RESET switch became inoperative after the stop level has been detected.

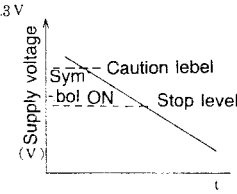


[Fig. 1]



Voltage detect IC operation

[Fig. 2]



[Fig. 3]

11. SERVICE PRECAUTIONS

11-1. Ground continuity test

There must be a resistance of 10Ω at most between the top cosmetic panel and the RAM card cover S1 and between the top cosmetic panel and S2.

11-2. RAM card switch test

① Set the CARD switch to the S1 OPEN position and turn the POWER switch off and on to check that nothing is displayed.
② Set the CARD switch to the S2 OPEN position and turn POWER switch off and on to check that nothing is displayed.

11-3. Display test

Because the memory contents are erased after this test, the data in the memory must be saved on the tape or disk.

① Enter the following commands on the keyboard.

```
10: ARUN
20: WAIT 20
30: BEEP 1
35: IF INKEY$ ="0" THEN 60
40: PRINT "88888888888888888888"
50: IF INKEY$ < >"0" THEN 30
60: POKE &287C,255,255
70: POKE &283C,255,255
80: GOTO 80
```

② Turn the POWER switch off and on again.
③ Depress the [0] key for about a second.
④ Check to see that all symbols are on and all eight column on the first line (several 8 are displayed on the second line).
⑤ Check for a missing display segment.
⑥ Do ALL RESET.

11-4. Soldering component

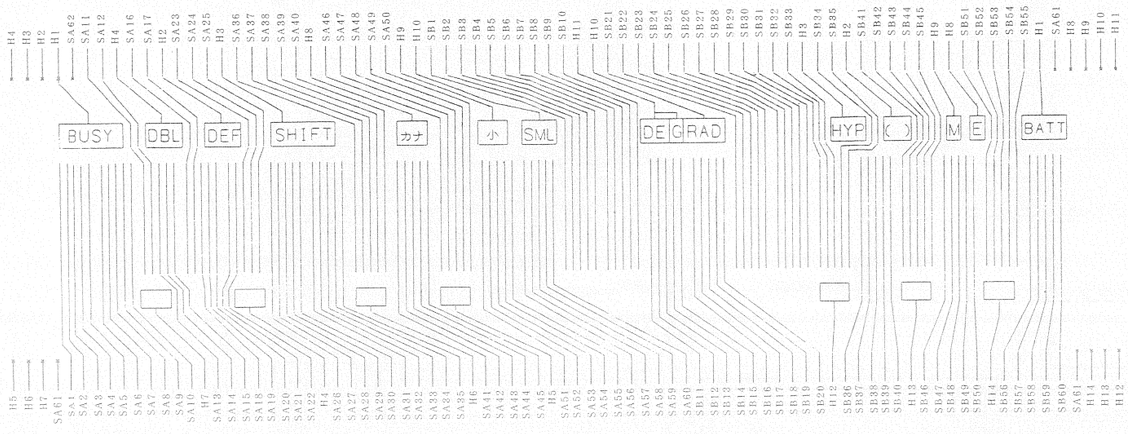
- All components must be closed attached on the board.
- Use the specified solder (KR19RMA) for soldering of chips. Refer to Service Information, PCS-022.

11-5. Auto power off

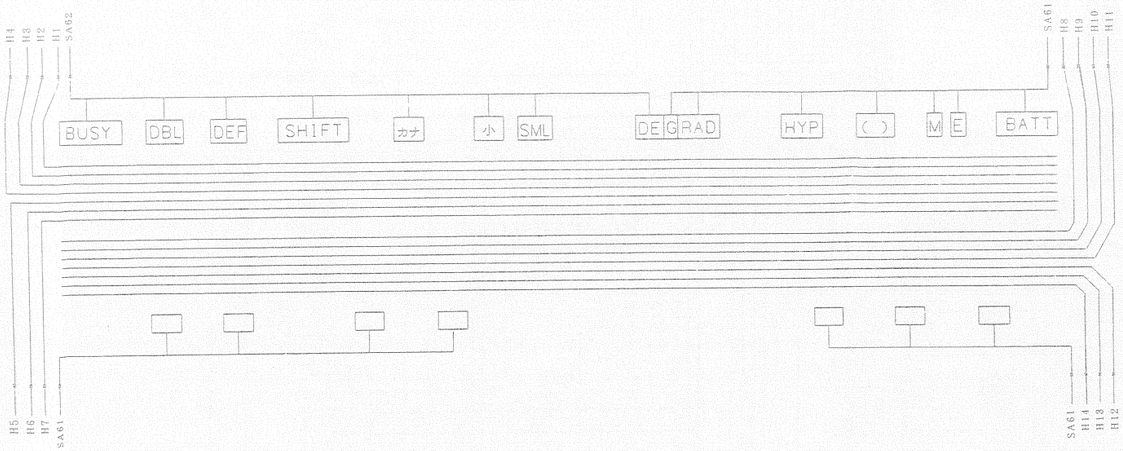
The auto power off function must come active after 10 minutes but not exceeding 12 minutes.

12. LCD SCHEMATICS

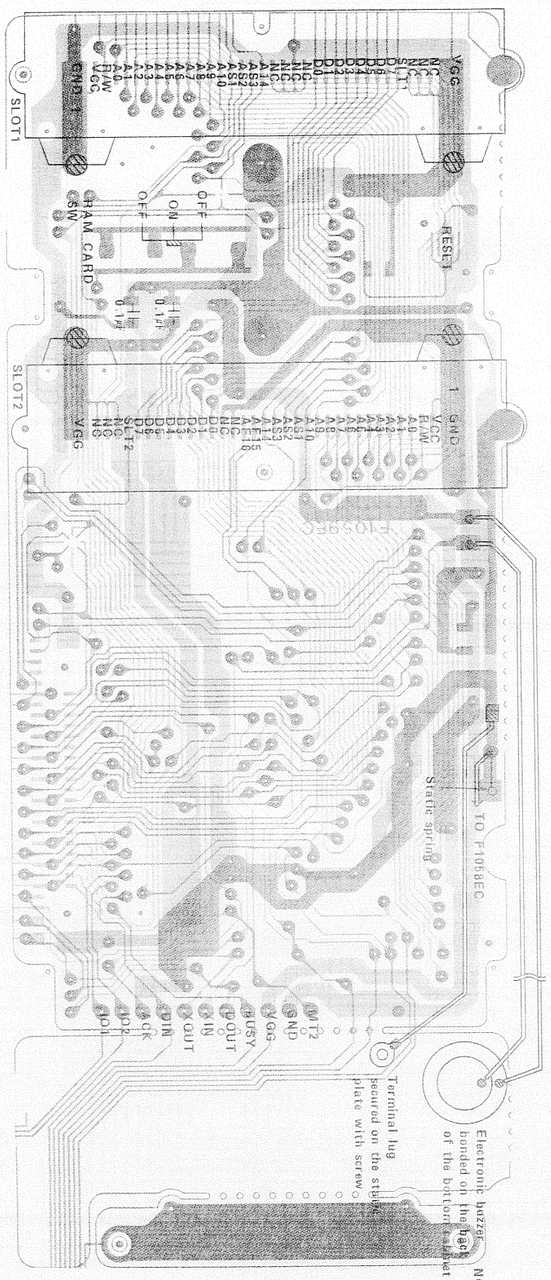
Segment

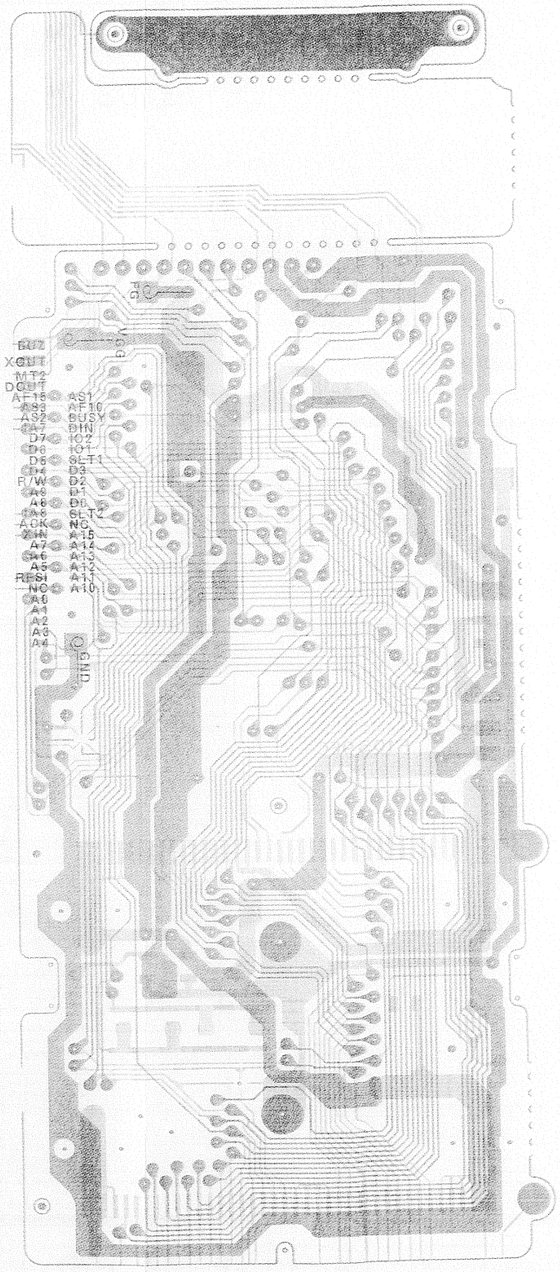


Common

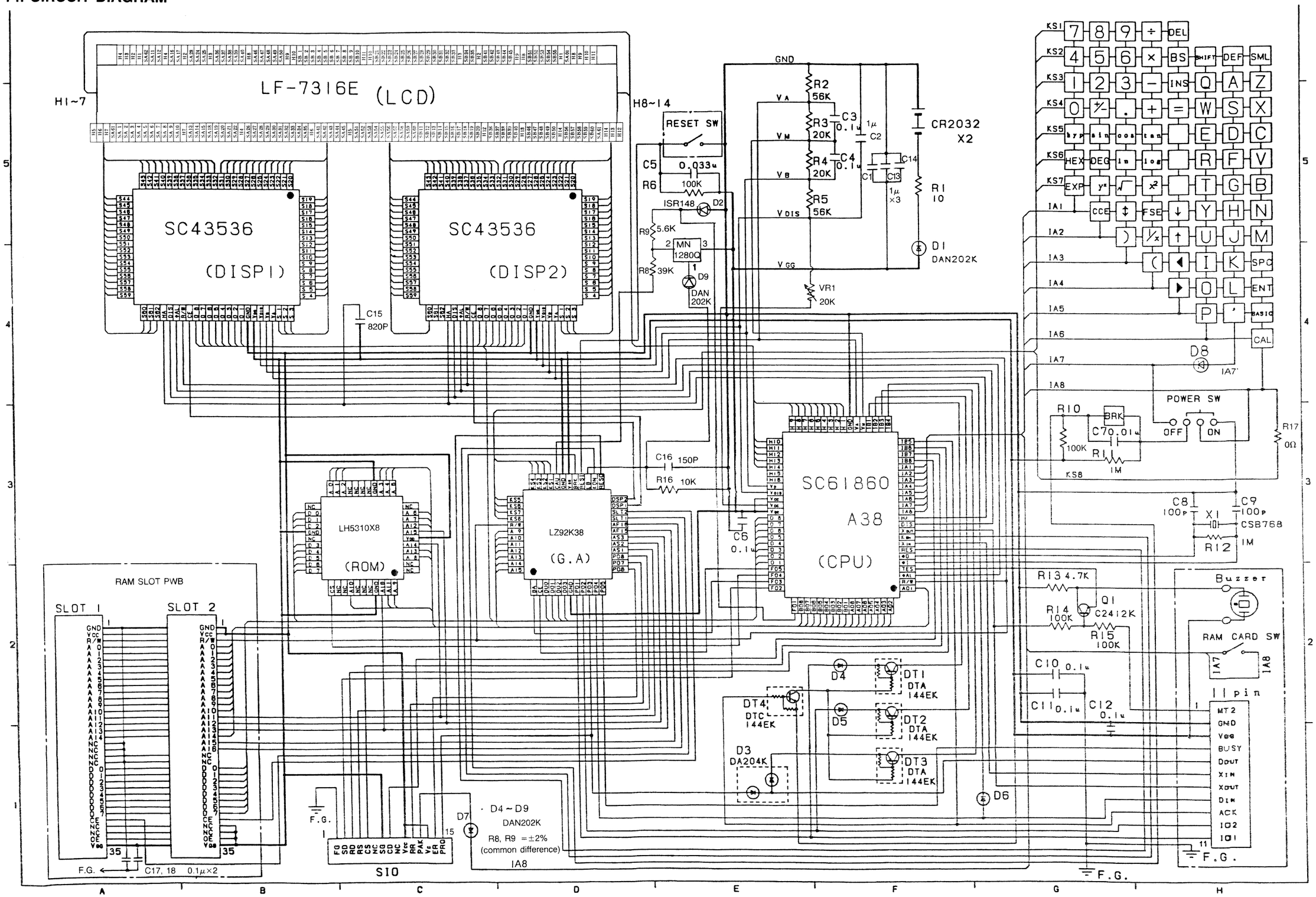


13. RAM SLOT PWB PARTS LAYOUT

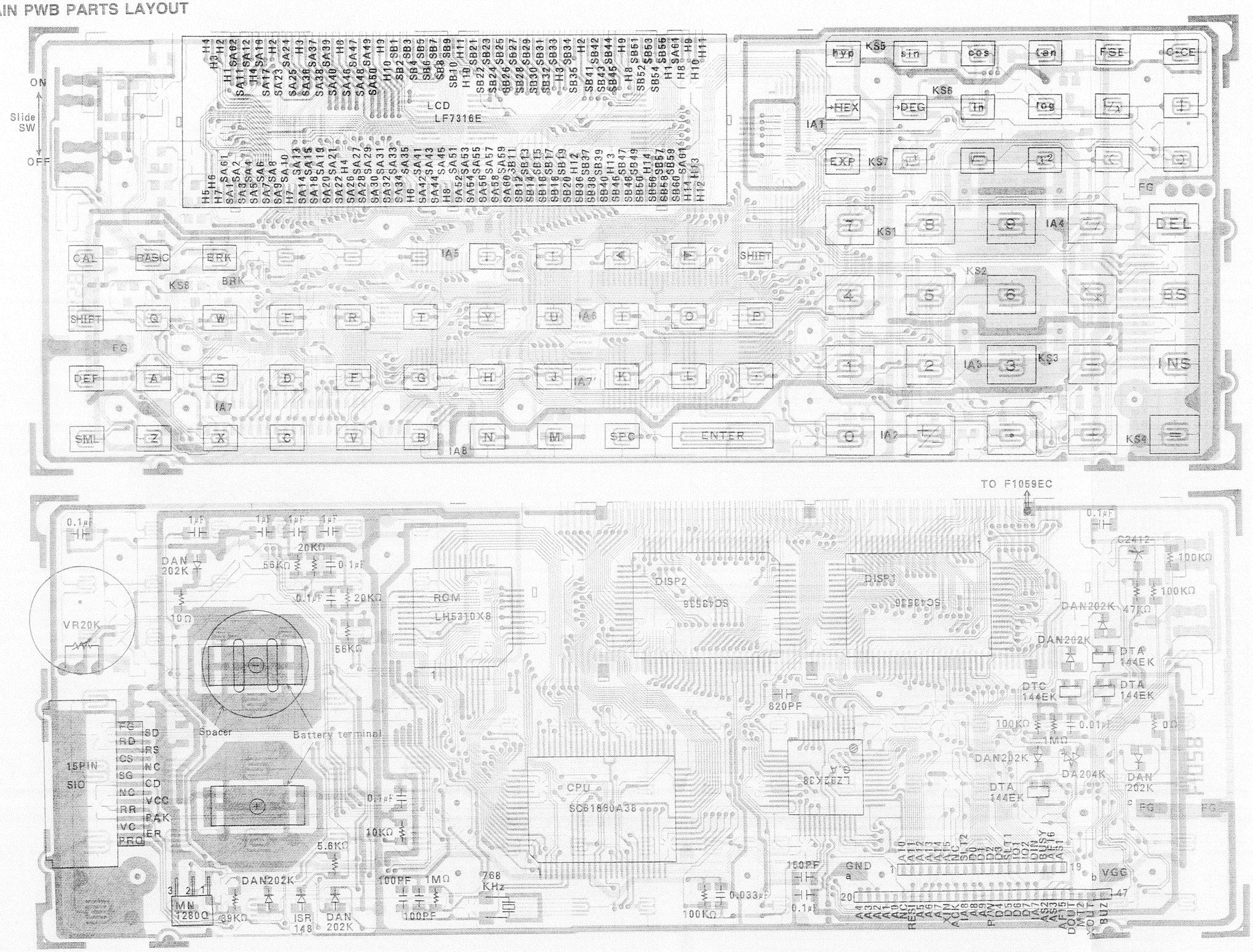




14. CIRCUIT DIAGRAM



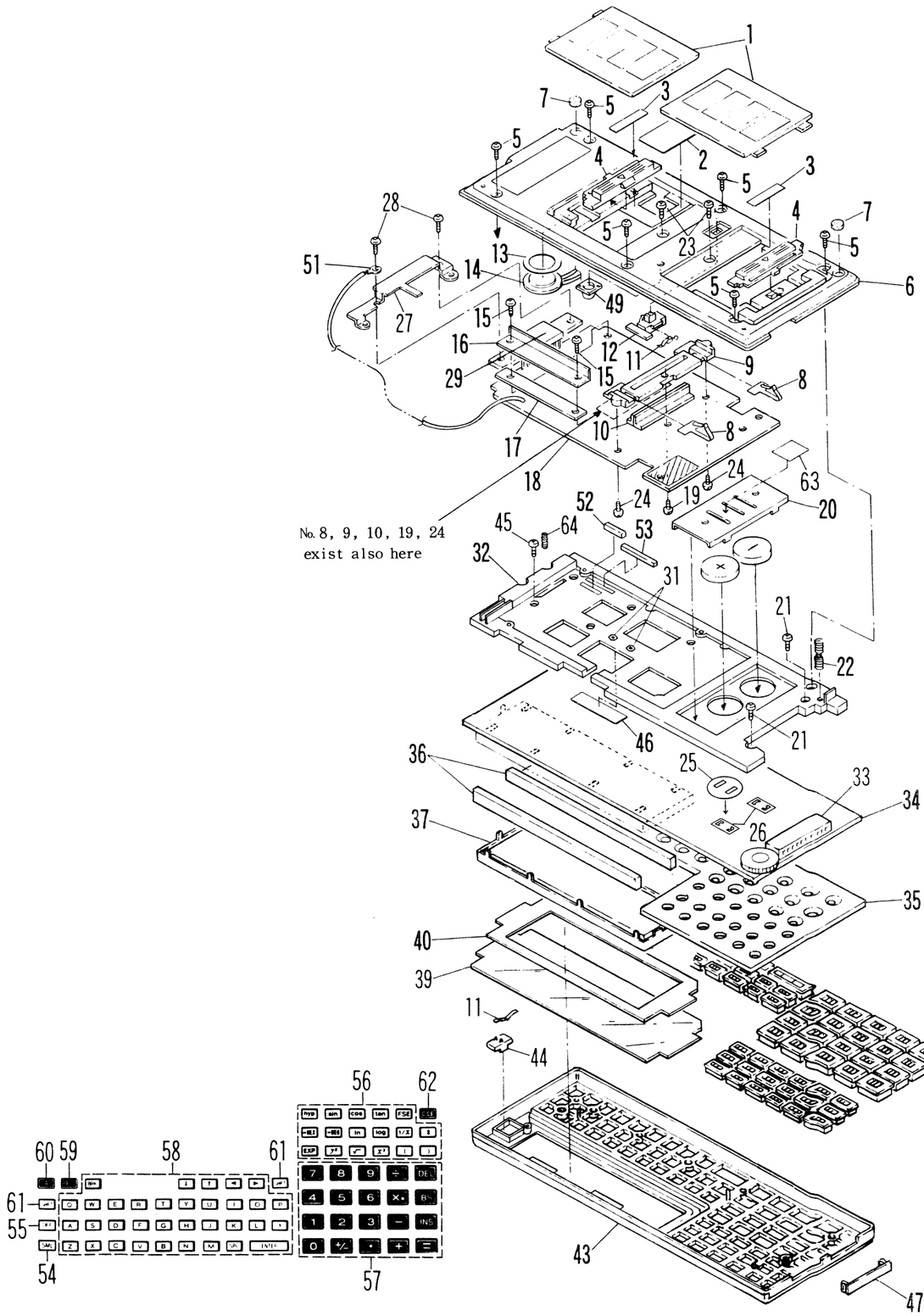
15. MAIN PWB PARTS LAYOUT



16. PARTS LIST & GUIDE

1 Exteriors

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
1	GFTAU1006ECSA	AF		D	Card cover
2	HPNLC1004ECZZ	AB		C	Panel
3	PTPEH1137CCZZ	AA		D	Tape
4	LFiX-1190CC01	AC		C	Card fixing plate
5	XUBSF20P06000	AA		C	Screw (2×6)
6	GCABA1015ECSA	AF		D	Bottom cabinet
7	GLEGG1031CCZZ	AA		C	Rubber foot
8	QTANZ1478CCSA	AC		C	Power terminal
9	LHLDZ1215CC01	AC		C	Connector holder
10	PGUMS1549CCZZ	AE		C	PWB card connector
11	QCNTM1042CCZZ	AA		C	Slide switch terminal
12	MSLiP1001ECSA	AB		C	Card cover switch knob
13	PTPEH1213CCZZ	AB		C	Tape (for buzzer)
14	RALMB1030CCZZ	AD		B	Buzzer
15	LX-BZ1163CCZZ	AA		C	Screw (2×8.8)
16	LANGK1008ECZZ	AC		C	Pressure angle
17	PSPAP1005ECZZ	AA		C	Pressure spacer
18	DUNTK1234ECZZ	AZ	N	E	RAM slot PWB unit
19	LX-BZ1120CCZZ	AA		C	Screw
20	QTANZ1406CCZZ	AB		C	Battery terminal (⊕⊖)
21	XUBSD20P06000	AA		C	Screw (2×6)
22	MSPRC1300CCZZ	AA		C	Card cover spring
23	XBBSF20P06000	AA		C	Screw (2×6)
24	LX-BZ1207CCZZ	AA		C	Screw (2×8)
25	PZETL1313CCZZ	AA		C	Spacer for battery terminal(Round)
26	QTANZ1289CCZZ	AB		C	Battery terminal
27	LANGK1566CCZZ	AC		C	Angle
28	LX-BZ1147CCZZ	AA		C	Screw (2×4.5)
29	QCNCW1385CC1B	AH		C	Connector (12pin)
31	LX-NZ1010CCZZ	AA		C	Nut (2㎜)
32	LCHSS1002ECZZ	AE	N	C	Chassis
33	QCNCW1368CC1E	AM		C	Connector (15pin)
34	DUNTK1242ECZZ	BR	N	E	Main PWB unit
35	PGUMM1587CCZZ	AH		B	Rubber spring
36	PGUMS1014ECZZ	AB		C	Rubber
37	DUNT-1221ECZZ	AS		E	LCD unit
39	PFiLV1008ECZZ	AC		C	Polarized filter
40	PSLDP1018ECZZ	AB	N	C	Display mask
43	DUNTG1231ECZZ	AW	N	D	Top cabinet unit
44	MSLiP1020CC01	AB		C	Slider
45	LX-BZ1184CCZZ	AA		C	Screw (2×5.5)
46	PSHEZ1012ECZZ	AA		C	Nut fixing sheet
47	GFTAA1287CC04	AB		D	Connector cover
49	PGUMM1594CCZZ	AB		C	Reset spring rubber
51	QLUGE1005CCZZ	AA		C	Lug terminal
52	PGUMS1007ECZZ	AB		C	Connector rubber A
53	PGUMS1008ECZZ	AB		C	Connector rubber B
54	JKNBZ1604CCSC	AH		C	Key top(SML key) (48pcs)
55	JKNBZ1604CCSD	AH		C	Key top(DEF key) (48pcs)
56	JKNBZ1604CCSE	AF		C	Key top(Function keys) (2set)
57	JKNBZ1603CCZA	AF	N	C	Key top(Numeric keys) (1set)
58	JKNBZ1873CCSB	AF		C	Key top(Alphabet keys) (1set)
59	JKNBZ1874CC01	AF		C	Key top(BASIC key) (48pcs)
60	JKNBZ1874CC02	AF		D	Key top(CAL key) (48pcs)
61	JKNBZ1909CC01	AF		C	Key top(SHIFT key) (48pcs)
62	JKNBZ1916CC03	AF		D	Key top(C·CE key) (48pcs)
63	TLABZ2240CCZZ	AA		C	Battery lid label
64	MSPRC1015ECZZ	AA		C	Static spring



2 Main PWB unit

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
1	DUNT-1221ECZZ	AS		E	LCD unit
2	MSPRC1277CCZZ	AA		C	Connector spring (for 15pin connector)
3	PZETL1313CCZZ	AA		C	Spacer for battery terminal(Round)
4	QCNCW1368CC1E	AM		C	Connector (15pin)
5	QTANZ1289CCZZ	AB		C	Battery terminal
6	RC-CZD105ECZZ	AC		C	Capacitor (1μF)
7	RC-CZ1047CCZZ	AB		C	Capacitor (0.033μF)
8	RCRSZ1003ECZZ	AE		B	Crystal (768KHz)
9	RH-DZ1001ECN1	AD		B	Diode (1SR148)
10	RVR-Z2400QCZZ	AF		B	Variable resistor (20KΩ)
11	VCCCTP1HH101J	AA		C	Capacitor (50WV 100PF)
12	VCCCTP1HH151J	AA		C	Capacitor (50WV 150PF)
13	VCKYTP1EF104Z	AA		C	Capacitor (25WV 0.10μF)
14	VCKYTP1HB103K	AA		C	Capacitor (50WV 0.010μF)
15	VCKYTP1HB821K	AA		C	Capacitor (50WV 820PF)
16	VHDDAN202K/-1	AB		B	Diode (DAN202K)
17	VHDDA204K//-1	AC		B	Diode (DA204K)
18	VHiLH5310X8-1	AW		B	IC (LH5310X8)
19	VHiLZ92K38/-1	AN		B	IC (LZ92K38)
20	VHiMN1280Q/-1	AE		B	IC (MN1280Q)
21	VHiSC43536/-1	AX		B	IC (SC43536)
22	VHiSC61860A38	AX		B	IC (SC6180A38)
23	VRS-TP2BD000J	AA		C	Resistor (1/8W 0Ω ±5%)
24	VRS-TP2BD100J	AA		C	Resistor (1/8W 10Ω ±5%)
25	VRS-TP2BD103J	AA		C	Resistor (1/8W 10KΩ ±5%)
26	VRS-TP2BD104J	AA		C	Resistor (1/8W 100KΩ ±5%)
27	VRS-TP2BD105J	AA		C	Resistor (1/8W 1.0MΩ ±5%)
28	VRS-TP2BD203J	AA		C	Resistor (1/8W 20KΩ ±5%)
29	VRS-TP2BD393G	AA		C	Resistor (1/8W 39KΩ ±2%)
30	VRS-TP2BD472J	AA		C	Resistor (1/8W 4.7KΩ ±5%)
31	VRS-TP2BD562G	AA		C	Resistor (1/8W 5.6KΩ ±2%)
32	VRS-TP2BD563J	AA		C	Resistor (1/8W 56KΩ ±5%)
33	VSDTA144EK/-1	AC		B	Transistor (DTA144EK)
34	VSDTC144EK/-1	AC		B	Transistor (DTC144EK)
35	VS2SC2412K/-1	AB		C	Transistor (SC2412K)
	(Unit)				
901	DUNTK1242ECZZ	BR	N	E	Main PWB unit

3 RAM slot PWB unit

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
1	LHLDZ1215CC01	AC		C	Connector holder
2	LX-BZ1120CCZZ	AA		C	Screw
3	LX-BZ1207CCZZ	AA		C	Screw (2×8)
4	MSPRC1007ECZZ	AB		C	Card cover spring
5	MSPRC1207CCZZ	AB		C	Spring
6	PGUMS1549CCZZ	AE		C	PWB card connector
7	QCNCW1385CC1B	AH		C	Connector (12pin)
8	QLUGE1005CCZZ	AA		C	Lug terminal
9	QTANZ1478CCSA	AC		C	Power terminal
10	VCKYTP1EF104Z	AA		C	Capacitor (25WV 0.10μF)
	(Unit)				
901	DUNTK1234ECZZ	AZ	N	E	RAM slot PWB unit

4 Packing material & Accessories

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
1	GCASP1105CC01	AF		D	Hard case
2	LPLTP1119CCSA	AC	N	D	Template 2
3	LPLTP1119CCZZ	AB		C	Template
4	TiNSE1125ECZZ	AZ	N	D	Instruction book
5	TLABH1164ECZZ	AA	N	D	Label (battery caution)
6	TLABH1141ECZZ	AC	N	D	Operation label
7	TLABP1165ECZZ	AA	N	D	Label (battery indication)
8	SPAKC0292ECZZ	AE	N	D	Packing case